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Aggression and self injurious behaviors: the effects of behavior interventions in young adults with autism spectrum disorder

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AGGRESSION AND SELF-INJURIOUS BEHAVIORS: THE EFFECTS OF BEHAVIOR INTERVENTIONS IN YOUNG ADULTS WITH AUTISM SPECTRUM DISORDER

by

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Dedications

I dedicate this manuscript to my daughters: Oceanna, Kailee and Emery as they endured many nights and weekends where their bedtime, playtime and mommy cuddles were sacrificed to produce this document. I would also like to dedicate this work to each of my parents because they have supported me through every one of my endeavors and continue to provide me the encouragement to keep achieving my dreams. Lastly, I dedicate this to Scott because he is the glue that helps me keep it all together.

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Abstract

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The purpose of this study was to examine the effects of two behavioral interventions of young adults with autism spectrum disorder that present with aggressive and self-injurious behavior. The results were analyzed to determine the successes and comparisons of the interventions to decrease challenging behaviors. The participants were two young adult male students diagnosed with autism spectrum disorder; both use an AAC device as their primary means of communication. Data was collected using a reversal (A-B-A-B) study design, with collection during a baseline phase, intervention phase one, reversal withdrawal of intervention phase two and re-implementation of intervention phase three. The independent variables in the study were the sensory diet and functional communication training. The dependent variables in the study were the student's behavior and ability to decrease aggression and self-injury. Overall, the results of the study demonstrated that the use of a strictly regimented sensory diet, which provided the integration of sensory activities every 45 minutes to one hour throughout the course of the school day to be the most effective intervention to decrease aggressive and self-injurious behavior. The study demonstrated results for use of functional communication training intervention to be ineffective.

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Chapter 1

Introduction

The American Psychiatric Association defines autism spectrum disorder, or ASD, as a complex developmental disorder that can cause problems with thinking, feeling, language and the ability to relate to others (American Psychiatric Association, 2016). ASD, as a spectrum disorder, includes a wide range of symptoms, the effects and severity of which are different in each person. ASD is a neurological disorder. The Center for Disease Control states that 1 in 68 children have been identified with ASD. ASD is 4.5 times more common among males (1 in 42) than among females (1 in 189). The Centers for Disease Control and Prevention (2016) defines ASD as a developmental disability that can cause significant social, communication and behavioral challenges.

Two prevalent behavioral challenges for individuals with ASD are aggression and self-injurious behaviors. Self-injurious behavior is characterized by behaviors such as head banging, scratching of self, biting, hitting or punching, hair pulling, eye poking or any like behavior of which the individual inflicts upon their self. Recent information provided by the Autism and Developmental Disabilities Monitoring (ADDM) Network states that nearly 28% of 8-year-old children with ASD behave in ways that can lead to self-injury. These behaviors are often repetitive in nature and are usually without the willful intent to self-harm, yet result in physical harm of the individual. There are serious health consequences that may result from SIB that include fractures, concussions, lacerations, contusions and other injuries that may lead to hospitalizations or even death

(Soke, 2016). In a time of crisis where self-injurious behavior is present, it is the responsibility of others to intervene to try to stop or redirect the behavior; however, intervening when a person is in crisis can lead to one becoming a target of aggressive behavior.

Aggression is characterized as behavior that is threating or likely to cause harm. It may be verbal or physical in nature. Physical aggression is the act of hitting, biting, kicking, striking, pinching, hair pulling or throwing of objects at another person. Aggression can be demonstrated in one form or many forms and the duration, intensity and frequencies can vary from one individual to another as well as one incident to another (Fitzpatrick, 2016).

Often SIB is a precursor to aggressive behavior; however the two challenging behaviors can be isolated without the presence of the other. Both behaviors are complex and challenging for all involved. They lead to a plethora of issues that interfere with the individual's ability to live a quality life. These individuals may be unable to function in typical home or school setting, thus need placement in residential facilities or restrictive school environments. Peer and societal acceptance is often hindered too as these children are not welcomed at birthday parties, after-school activities, community sports and other extra-curricular activities. Both self-injurious behavior and aggression are major challenges for caregivers, teachers and individuals with ASD. There is a need for interventions to address these behaviors with the intent to replace or redirect the behavior.

There are several different interventions that can be implemented to address SIB

and aggressive behaviors for individuals with ASD. One form of intervention is pharmacological treatments or medication. This is a choice for the parent or guardian to treat challenging behaviors. There are several types of alternative interventions that can be implemented for challenging behaviors such as SIB and aggression in individuals with ASD. Beyond drug treatments, interventions can include but are not limited to antecedent manipulation, change in instructional content, differential reinforcement, self-management, sensory integration and functional communication training.

Research Problem

The focus of my study will be directed only towards young adults diagnosed with ASD that present with self-injurious and aggressive behaviors. This study will place emphasis on the implementation of two different behavioral interventions to reduce the amount of self-injurious and aggressive behaviors that occur daily in both the classroom and community based instruction environment.

The questions to be investigated in this study include:

1. Will the use of a strictly regimented sensory diet reduce SIB and aggression in young adults with autism spectrum disorder?
2. Will functional communication training using an IPad® for an AAC device decrease the amount of SIB and aggressive behaviors in young adults with autism spectrum disorder?

Key Terms

Sensory Diet –a classroom program of daily scheduled sensory-based activities aimed at

fulfilling an individual's sensory needs. (Baranek, 2002). Examples of activities that are included for this study are as follows: jumping on trampoline, squats, jumps, wall clap pushups, riding Rifton bike, walk on track, medicine ball catch, heavy wedge pushes, use of Chi Machine, weighted blanket, weighted vest, quiet room with calm music, large bean bag to lay/sit, Theraputty with hidden manipulatives/objects, playing catch with staff or peer, therapy ball activities.

Functional Communication Training – is used to replace interfering behaviors or subtle, less clear communicative forms with more conventional communicative forms. (National Professional Development Center on Autism Spectrum Disorders, 2010)

Implications

Implementations of behavioral interventions demand precise follow-through of clearly defined procedures. In the event that support staff or educators within the classroom or community based setting do not follow the intervention procedures exactly, the data and results can be effected. Community based instruction and the classroom is an environment that allows for uncontrolled and spontaneous environmental factors that can have an effect on subjects especially given their diagnosis of autism. Lastly, student or staff absence can affect the results of interventions as data cannot be taken if subject is absent and data can be offset by a substitute staff whom is not familiar with the data collection method or not familiar with the subject.

Summary

Many individuals with ASD present with challenging behaviors. Some to the

most difficult behaviors include self-injurious behaviors and aggression. These behaviors present several risk factors and decreased quality of life for autistic young adults, including social isolation, serious health consequences and inability to function in typical home, school and community environments. This study was conducted in a private out-of-district-placement secondary school within the Community Based Instruction (CBI) program with young adults that have ASD as a primary diagnosis and present with self-injurious and aggressive behaviors. In this study, I examined the effects of two different behavioral interventions with two non-verbal male students to see which behavior interventions prove successful. I implemented a strictly scheduled sensory diet and functional communication training using IPad®. It was hypothesized that these interventions will decrease self-injurious and aggressive behaviors in non-verbal autistic students.

Chapter 2

Literature Review

Individuals with ASD are faced with life challenges on a daily basis. These challenges are present across routine environmental settings such as the home, school and community. These challenges vary in forms given that each individual with autism is unique. Core deficits that are present for individuals with ASD are social differences, communication differences, repetitive behaviors and sensory differences (CDC, 2012). The most severe end of the spectrum includes minimal or absence of language, non-verbal, and intense incidents of self-injurious and aggressive behaviors. Our limited understanding of how to intervene in these incidents, especially in the school, classroom and community based instruction environments, demands attention and research. In this chapter, I will review current research and studies examining self-injurious behaviors, aggressive behaviors and interventions for these behaviors used to treat ASD individuals.

Self-Injurious Behavior

The Kennedy Krieger Institute describes self-injurious behavior as the occurrence of a behavior that results in physical injury to one's own body. SIB is a highly complex, diverse phenomenon that is often a result of a variety of factors, of which are displayed by individuals with autism and intellectual disabilities (Kennedy Kreiger Institute, 2017). Self-injurious behavior is one of the most devastating behaviors exhibited by people with developmental disabilities (Autism Research Institute, 2011). Determining the function of SIB can be difficult, especially when the person has limited or absence of verbal

language. It takes careful examination of the individual's behavior to determine the most appropriate intervention. Soke (2016) conducted a population based study, discussing the prevalence of self-injurious behaviors among children with ASD. This study examined ADDM Network data collected during the 2000, 2006 and 2008 surveillance years to evaluate the prevalence of SIB in a large population-based sample of children with ASD in the United States. The study included 8065 children, 8 year olds, who met the case definition of ASD in the Autism and Developmental Disabilities Monitoring (ADDM) Network via health records from providers that serve children with development disabilities and educational records from children receiving special education services. SIB was defined as "any self-directed behavior that could cause physical harm or a sign or bodily mark of the act, such as picking fingers until bleeding, sucking fingers until chapped, slapping self in face, head banging, ect." (Soke, 2016) The determination of the presence of SIB was indicated by categorizing record samples as yes (present) or no (not-present). The results of this study found that the prevalence of SIB in a population-based study of ASD averaged 27.7% over the three surveillance years, suggesting that self-injurious behavior in ASD are common and deserve more research attention. (Soke, 2016)

Another study conducted by Richards (2012), contrasted the prevalence of SIB in individuals with ASD to individuals with Fragile X and Down syndromes. For this study, participants with ASD, Fragile X and Down Syndrome were recruited from the United Kingdom via the National Autistic Society, Fragile X Society and the Down's Syndrome Association. There were 321 individuals included in the analysis that met criteria for the

study via a caregiver questionnaire packet. The questionnaire was presented as a survey to investigate behaviors associated with the relevant syndrome group. The subjects were between the ages of 4 and 62, ages 4-39 ASD, ages 4-62 Down syndrome, ages 6-47 Fragile X syndrome. The results of the study concluded that self-injurious behavior was displayed by 50% of the ASD sample compared to 18% of the Down syndrome group, yet a similar prevalence in Fragile X syndrome displaying 54%. Self-injury was noted with higher levels of autistic type behavior within the Down syndrome and Fragile X syndrome groups. In summary, individuals across all three groups that engaged in SIB presented with higher levels of ASD behaviors associated with significantly higher levels of impulsivity and hyperactivity, negative affect and significantly lower levels of ability and speech (Richards, 2012).

Teachers and caregivers are often required to intervene to maintain the safety of individuals that present with SIB. The self-inflicted physical injury is rhythmic and repetitive and can range from mild head rubbing up to severe head banging that can become life threatening (Duerden, 2012). Self-injurious behavior is one of the main causes of hospitalization in children with ASD (Mandell, 2008).

Aggressive Behavior

Aggression is characterized as behavior that is threatening or likely to cause harm whether verbal or physical (Fitzpatrick, 2016). For the purpose of this study, the focus is on that of physical aggression towards others. This may be in the form of hitting, punching, kicking, pinching, head-butting, biting or other acts of physical harm directed

towards another person. Aggression is a learned behavior or set of behaviors that is socially mediated given it occurs in social context; someone must be present to be the target of the aggression. The desired outcome may be either to gain attention from the recipient or bystander, to gain access to a thing or item, to escape or avoid a demand or non-preferred environment, or to achieve multiple desired outcomes (Brosnan, 2011).

Research is still limited with regards to studies of aggression in children with ASD. In 2011, a group study was performed that evaluated aggressive behaviors in 1,380 children between the ages of 4 and 17 with ASD. It was found that 56% were engaging in aggressive behaviors towards caregivers (parents and like) and 32% engaging in aggressive behaviors towards non-caregivers (teachers and like). The study also noted that 68% had previously engaged in aggressive behaviors towards caregivers and 49% towards non-caregivers (Mazurek, 2011). These results denote that aggressive behaviors are a major challenge for individuals with ASD, their parents and their teachers.

Aggression can appear different in any given setting and from one incident to another. An individual can demonstrate one form of aggressive behavior or many that varies in frequency, intensity and duration. (Fitzpatrick, 2016) As individuals with autism age, the severities of the challenging behaviors such as aggression and SIB have the potential to become more prominent (Mazurek, 2011). The stature and physical strength of an older individual with ASD is much different than that of the younger ASD population. Thus adults will often engage in challenging behavior that is considerably more intense in comparison to their younger counterparts (Manente, 2010).

In a study by Fitzpatrick (2015), aggression behavior in ASD was compared to that of other groups of clinic-referred children without ASD, using the Children's Scale for Hostility and Aggression: Reactive/Proactive (C-SHARP) and the Aggression subscale of the Child Behavior Checklist (CBCL). The participants of the study were between the ages of 1 to 21 and not selected for aggressive behavior. The parent-rated C-SHARP contains five subscales: Verbal Aggression, Bullying, Covert Aggression, Hostility and Physical Aggression; in which each item receives two ratings: The Problem Scale that reflects the frequency and severity of the behavior. One of the findings noted that older age was associated with more complex aggressive behaviors in the ASD group. (Farmer, 2016) Aggression is a challenging behavior that lends to many negative outcomes for individuals with ASD that include lack of social relationships, placement in restrictive school and residential settings, use of physical interventions and increased risk of being victimized. Additionally, aggressive behaviors lend to teacher and staff burnout which impacts quality education for students with ASD. Lastly, aggression contributes to increased stress for caregivers of individuals with ASD as well as financial problems, lack of support services, and an overall troubling impact on the day-to-day life and wellbeing of the family unit. (Fitzpatrick, 2016)

Definitely, research shows that aggression and SIB are problematic and challenging behaviors that require effective interventions to increase the quality of life for individuals with ASD.

Sensory Diet

Sensory functioning abnormalities were once considered peripheral to ASD rather than a core symptom (Hazen, Stornelli, O'Rourke, et. al.). In 2013, the fifth edition of the DSM (DSM-5) updated the diagnostic criteria for ASD into the domain of "restricted repetitive behaviors" (RRB) to include sensory symptoms such as over or under-responsiveness to sensory stimuli or atypical interest in sensory information (Volkmar, Reichow, & McPartland, 2012). Disorders of sensory-modulation are among the most common symptoms observed in individuals with ASD (Hazen, at el). There are three categories of sensory-modulation disorder, sensory overresponsivity (SOR), sensory underresponsivity and sensory-seeking behavior. Sensory overresponsivity, SOR, is when an individual experiences distress or displays a negative response to sensory input, often leading to avoidance related to the stimulus. Sensory underresponsivity is when an individual has a slow response or seems unaware of a stimulus that would normally cause a response. This is important in regards to an underresponsivity to pain which can lead to injury when an individual continues to engage in a behavior such as forms of self-injurious behavior or placing hand or fingers into fire. Lastly, sensory seeking behavior is when an individual present with an unusual need or craving for certain sensory experiences (Hazen at el, 2012).

Researchers such as Jean Ayres (1972) have attempted to identify a biological cause for abnormal behaviors such as SIB and aggression in individuals with ASD. Ayres and Tickle (1980) hypothesized that deficits in the nervous systems ability to process sensory stimuli normally is a factor for abnormal behaviors in ASD. From this

hypothesis, Sensory Integration Therapy (SIT) has derived. SIT is thought to help the nervous system to process stimuli effectively by providing specific forms of sensory stimulation in careful doses (Lang, 2012) In 1999, Watling, Deitz, Kanny and McLaughlin, surveyed 72 occupational therapist (OT), finding that SIT was among the most common interventions delivered to children with ASD, given 99% of responding OT's regularly implemented sensory integration therapy. A derivative of SIT is another key component coined by OT, Patricia Walbarger, is a strictly regimented schedule of sensory-based activities uniquely designed to each individual, at specific intervals throughout the day to see that sensory needs are met in a safe, controlled and socially appropriate manner. (Hazen et al, 2012)

According to Devlin (2008), sensory-integration dysfunction impairs the vestibular (sensory input to the brain about body's movement through space), proprioceptive (sensory input for muscles and joints) and tactile (sensory input of touch-lack of sensitivity or oversensitivity to stimuli) systems. The sensory diet may involve but are not limited to activities such as, jumping on a trampoline, swinging, rolling, riding scooter boards, deep pressure, joint compression and body brushing. (Devlin et al, 2008) In 1988, came the first study to produce a positive result on self-injurious behavior using SIT on an individual with mental retardation (Dura, Mulick, & Hammer, 1988). Dura and colleagues used a multi-element design to evaluate the effects of sensory integration therapy on a 15-year old nonambulatory male. The vestibular stimulation consisted of movement back and forth on a swing while the boy sat on a therapist lap. The results indicated zero attempts of SIB during vestibular stimulation, during SIT, but not

following the treatment session. (Dura et al, 1988) More recent studies have expressed more controversial results in terms of effectiveness of SIT. In 2009, Devlin reported the results of a single-subject alternating treatment design with an initial baseline and final treatment phase, of which treatments were alternated across daily session. The subject was a 10-year-old male diagnosed with ASD who engaged in SIB (hand mouthing and hand-biting) across both home and school settings. Devlin et al. used a net swing, therapy ball, beanbag, lycra blanket, trampoline and "T" shaped 'chewy tube' for SIT materials. Alternation treatments consisted of a sensory diet and behavioral intervention across a 10-day span beginning with a sensory diet on Day 1 and alternating with behavioral intervention on Day 2 and so forth. The results indicated that behavioral intervention was more effective than SIT for the treatment of SIB. The number of incidents on Day 1 (SIT) was 15 incidents and on the final day of SIT, 13 incidents. The number of SIB incidents on Day 1 of behavioral intervention was 13 incidents and on the final day 4 incidents. Thus, during the final phase of the study SIT ceased and only behavioral intervention continued decreasing SIB even further (Devlin et al, 2009).

In 2015, Watling and Hauer, both Occupational Therapists, composed a systemic review of 23 studies between January 2006 to April 2013 to assess the effectiveness of Ayers Sensory Integration (ASI) and Sensory Based Interventions (SBI). ASI typically occurs in the clinical setting due to the need for specialized, controlled environments for the intervention. Watling explains, "the ASI approach aims to change internal neurophysiological processing of sensation to promote observable change in sensory responsiveness and functional behavior." Whereas, SBI is sensory integration therapy

that occurs in the child's natural environment composed of adult directed sensory activities such as a weighted vest, brushing, bouncing on a ball or bouncing a ball or adapted seating devices that allow motion with the aim of producing a short-term effect on behavior, self-regulation or attention. SBI is provided in a systematic manner throughout the day or as the individual needs in the form of a sensory diet (Watling et al, 2015). The participants included a total of 506 participants ranging from 2 years to 39 years old with a diagnoses of ASD, the majority of the participants were male. A wide range of assessment tools were reported, higher level studies included the use of 15 published tools such as Goal Attainment Scaling and the Vineland Adaptive Behavior Scale, lower level studies reported the use of observational methods. Only two studies were conducted by occupation therapist and 11 were conducted outside of occupational therapy (Watling et al., 2015). Four of the studies in this review used clear and distinct definitions for ASI, where 3 demonstrated meaningful and positive effects on reduction of ASD mannerisms. SBI results included a wide variety of strategies use to effect behavior changes based on sensory input; it was necessary to place the SBI studies into three categories: multisensory, single sensory and environmental modifications. The results of the single-sensory found little to no effects on individuals with ASD, however it was found that multisensory interventions had more meaningful effects. Overall, Watling et al. summarized that moderate evidence was found to support the use of ASI and that SBI methods were mixed and need clear and descriptive definitions of interventions being used, controlled setting and participants to measure fidelity to make SBI more evidence based.

After reviewing research articles, sensory integration therapy and the use of a sensory diet has produced inconsistent results to decrease challenging behaviors in the classroom, home and community environment. This is despite the wide use of SIT by occupational therapist, teachers and parents.

Functional Communication Training

ASD includes individuals that range from average or above-average abilities, some considered gifted, to others with significant intellectual and communication impairments (Simpson, 2008) For those at the latter end of the spectrum, that are considered nonverbal or individuals with limited language, need ways to communicate their wants and needs. For individuals with ASD, limited language is one aspect of a more general problem who have additional difficulties with social behavior (Pickles, 2009). Those who engage in self-injury present with higher means of overactivity, impulsivity, have a more negative affect, are less able and non-verbal (Richards, 2012) Functional Communicating Training (FCT) is one of the most common and effective interventions used for severe behavior problems (Tiger, Hanley, & Bruzek, 2008). Functional Communication Training is teaching a socially appropriate communicative alternative to replace a challenging behavior; it is thought that sometimes self-injury and/or aggression may represent unconventional verbal behavior (Sifafoos & Meikle, 1996). FCT is aimed to deliver the same reinforcing consequences (attention, access to a preferred object, avoidance of task demand) by replacing aggression or SIB with functional means of communication such as verbal statements, a card touch/exchange, or sign language (Manente, 2010).

In 1985, Carr and Durand produced one of the first studies that explored FCT. This study was composed of two experiments; the first experiment was conducted to determine the function and frequency of maladaptive behavior, known currently as a Functional Behavior Assessment, experiment two wanted to reduce the behavior problems identified in experiment one by teaching verbal communicative phrases. The subjects used in the study were four children, two males and two females between the ages of 7 to 14 years old. All four children displayed a variety of aggressive, self-destructive and disruptive behaviors; one child had and ASD diagnosis, two classified to have brain damage and once developmentally delayed with a severe hearing impairment. Experiment two aimed to teach the children appropriate communicative statements "I don't understand" and "Am I doing good work?" to replace maladaptive and off-task behaviors. The results from this study concluded that FCT can be a successful intervention to reduce behavior problems by teaching functional means of communication that are effective in altering stimulus conditions. (Carr & Durand, 1985)

A single-subject, changing-criterion design study ($A\text{-}B^1\text{-}B^2\text{-}B^3\text{-}B^4$ design) was used to demonstrate behavioral intervention methods that included FCT to decrease SIB in a 14 year-old male diagnosed with severe ASD (Boesch, 2015). The subject was nonverbal, he had fewer than 10 spoken words and his primary means of communicating was to lead others by the hand to request tangible preferred items. Occasionally, he communicated using manual signs or by pointing picture symbols, however this was usually prompted and rarely spontaneous. The adolescent also engaged in severe SIB in the form of face slapping that left visible red marks on his cheeks and have caused nose

bleeds. He attended public school in a self-contained class. His typical school routine consisted of one-on-one instruction in sensory activities, sorting tasks, domestic tasks, daily grooming routines, adapted PE and community based instruction. The study was conducted by first obtaining baseline data on two primary outcomes SIB and manual signing. Partial-interval recording was used to document SIB given its high frequency, specifically any face slapping in 5 second intervals. It was determined that the subject engaged in the SIB due to denied access of preferred item, wrist weights, thus the sign for "want" was used for FCT to replace SIB. Event recording was used to document correct requesting using the sign form "want" during 1-minute fixed-interval trial. Given the overall purpose of this intervention was to fade the use of wrist weights the changing-criterion design was used to allow for sequential fading (Boesch, 2015). Immediately following baseline data, Phase A, FCT was implemented to teach the sign for "want" to request the wrist weights, which were kept in sight but out of reach. When the subject reached for the weights, hand-over-hand shaping, verbal and physical prompting were used simultaneous to teach him how to request before given access to wrist weights. After the training phase, mastery criterion was set at 100% accuracy signing "want" with no more than one verbal prompt for three consecutive opportunities. Phase B^1–B^3, combined a delayed schedule of reinforcement with FCT where the subject had to engage in structured activities for a set amount of time (1 min, 1.5 min, 2 mins) before receiving wrist weights. The wrist weights were designed to be faded due to their intrusiveness and being socially inappropriate. Phase B^4, the final intervention phase, the wristband was introduced to the subject and the wrist weights were completely eliminated. Results

showed that in Phase A, the subject did not appropriately manually sign "want" to gain access to the wrist weights. In Phase B^1, he appropriately requested an average of six times per session with an increasing trend. Phases B^2–B^4, the subject requested appropriately four times per session across the three phases. Data showed that correct requesting increased when SIB was placed on extinction for a specific duration. This study shows that challenging behavior, such as SIB, can be reduced using a behavior intervention package that includes FCT for a non-verbal adolescent with ASD.

In 2008, Tiger et al. composed a review of 91 articles identified through Psychino and ERIC that were published in an English-language scholarly journal that included FCT as an intervention for problem behavior. There were a total of 204 participants that comprised the review, ranging from children to adults, all of which were diagnosed with a developmental disability or mental retardation, 81 were diagnosed with ASD. The studies reviewed used FCT as an intervention for maladaptive behaviors mostly in the form of aggression, SIB or motor and vocal disruptions. The results of the article review found that problem behaviors were maintained due to successful FCT intervention by attention, access to materials/objects, escape from demands and other aversive events (Tiger, 2008)

After review of several research articles, studies indicate that FCT is a successful and effective intervention to decrease aggression and self-injurious behavior in individuals with developmental disabilities, specifically ASD. Literature shows how important sensory integration and functional communication is for individuals with ASD.

This study will further research the effectiveness of sensory integration and functional communication training with non-verbal young adults that have ASD.

Chapter 3

Methodology

Setting and Subjects

This study included two students who attend a private school, out of district placement, for moderately to severely disabled individuals. The school is located in a suburban southern New Jersey town. Both students are participants of the school's secondary program where the focus is to provide functional academics and vocational experiences in preparation for transition into adulthood. Both participants are students in the community based instruction program (CBI). The community based instruction program provides academic, vocational and therapeutic services using an integrated model to approximately 60 students with varying levels of cognitive, social and physical abilities.

The students chosen for this study have a medical diagnosis of ASD. They attend a private special education school to better prepare them for adult transition from school to work, continued educational day programming and community living. Both students have an Individualized Education Plan (IEP) and both are non-verbal. Each participant uses an augmentative and alternative communication (AAC) device, IPad® with individualized communication app as a means of communication.

Participant 1. IC is a 19-year-old Hispanic male who is non-verbal, has an IEP and receives special education services in a private school due to his diagnosis of autism. IC has impaired and altered thought processes related to abnormal processing of input,

decreased ability to focus and developmental delays. IC has sensory and perceptual alterations related to decreased control of sensory input and incomplete processing of sensory inputs – auditory, tactile and olfactory. IC presents with ineffective coping skills related to poor self-control, inability to anticipate consequences of actions and limited cognitive and social function. IC has an anxiety disorder and fear that relates to minimal understanding of sensory input. IC is a risk for injury due to his inability to recognize dangers of self-injurious behaviors and has a high tolerance for pain. He is a risk for aggressive and impulsive behavior that is both self-directed (SIB) and towards others. IC has impaired social interactions and often attempts to isolate himself. IC takes medication at home to help with neurobehavioral difficulties. IC has limited vocal communication and uses and IPad® with the Proloquo2go® app for communication. IC's typical school day consists of recreation and leisure activities, vocational activities 1 or 2 days a week in the community and classroom tasks that simulate worksite tasks in the school building. IC has a one-to-one support staff assigned to him at all times and across all settings throughout the course of his school day.

Participant 2. EE is an 18-year-old Caucasian male that is non-verbal, has an IEP and receives special education services in a private school due to his diagnosis of Pervasive Developmental Disorder (PDD)/autism. EE has a seizure disorder of which he takes medication to help control and has rescue medication in the event that he has a seizure that last for more than five minutes, this requires EE to have a nurse across all settings throughout his school day. EE has impaired and altered thought process related to abnormal processing of input, decreased ability to focus, and developmental delay. EE

has sensory and perceptual alteration related to inability to control sensory input and incomplete processing of sensory inputs (auditory, tactile and olfactory. EE presents with ineffective coping skills related to poor self-control, inability to anticipate consequences of action and limited cognitive and social functioning. EE has an anxiety disorder that lends to self-injurious behaviors such as banging his head which puts him at a risk for injury due to his inability to recognize dangers of SIB. EE is a risk for aggressive and impulsive behaviors that are self-directed (SIB) and towards others. Aggressive behaviors include head butting, punching, kicking and stomping. EE is also engaging in property destruction by kneeing, punching, banging and head butting objects such as wall, tables, desks, doors, and the like. EE engages in stereotypic behaviors such as rocking, fingers in ears and flapping of hands. His typical school day consist of recreation and leisure activities, vocational activities 1-2 days a week in the community and classroom tasks that simulate worksite tasks in the school building. In addition to a nurse, EE has a one-to-one support staff assigned to him at all times and across all settings throughout the course of his school day. EE has limited verbal abilities and uses an IPad® with the TouchChat® app for communication.

Procedure

The design of this study was a single-subject research design that followed a reversal design that consists of A-B-A-B treatment method. There were two behavioral interventions tested: sensory diet with Participant 1 and functional communication training with Participant 2. The two interventions were implemented May 2017 through August 2017.

The sensory diet was implemented with Participant 1 on a regimented schedule to occur every 45 minutes to 1 hour throughout the course of the school day. Participant 1 could choose from two presented activities that were presented in a picture format or by presenting the items directly in front of him to choose. The sensory activities that were offered to Participant 1 were dependent upon recognition of over-reactive or under-reactive sensory input needs. The activities offered ranged from playing ball/catch with staff or peers, pushing a heavy cart around the school, playing with theraputty, listen to yoga music while lying in a beanbag chair, playing with hand fidget, playing with light-up textured ball, playing connect four, playing with a sensory bin with dried peas, wearing a weighted vest, wall push-ups, wearing noise-cancelling headphones. Participant 1 was presented and engaged in these activities every 45 minutes to one hour throughout the course of the day: 9:45 am, 10:45 am, 11: 45 am, 12:30 pm and 1:30 pm. Data was collected on a 15-minute interval basis that recorded any self-injurious or aggressive behavior. The research design consisted of 3-weeks baseline data, 3-weeks treatment using sensory diet, 3-weeks reversal – withdrawal sensory diet and 3-weeks sensory diet. During the baseline collection Participant 1 was introduced to several different sensory input interventions to determine participant's interest.

Participant 2 received functional communication training (FCT). Functional communication training consisted of implementation of the use of the application TouchChat® on an IPad® to communicate "I'm finished" at the completion of a work task. The use of a cue card that is a direct replicate from the TouchChat® application, to help facilitate independent communication via a visual cue. FCT was implemented using

an A-B-A-B treatment design consisting of 2-weeks of baseline date, 2-weeks of implementation of FCT to replace aggressive and SIB behavior, 2-weeks of withdrawal cue card that will be implemented as a visual to promote communication via IPad® to replace SIB and aggression, 2-weeks of FCT to determine whether there is a decrease in SIB and aggression during treatment of FCT collected in 15-minute intervals. Participant 2 received FCT during his participation in the community based instruction at his jobsite. Participant 2 is assigned to work three days a week at his job site from 9:45 am until 11:45 am.

Participant 1 and Participant 2 each have a one-to-one aid who was trained to collect data via data sheet. The investigator participated in all aspects of Functional Communication Training for participant 2. The investigator participated in sampling of sensory activities for Participant 1 and the first week of implementation of sensory diet for Participant 1, after which the one-to-one aide implemented the sensory diet with the support of classroom teacher and related service team members.

Variables

The independent variables in the study were the sensory diet and functional communication training. These interventions aimed to decrease aggressive and self-injurious behaviors in young adults with autism spectrum disorder. The dependent variables in the study were the student's behavior and ability to decrease aggression and self-injury.

Experimental design

The sensory diet consists of a total of 12 weeks of data collection with six weeks of direct intervention of sensory integration activities, the components of the sensory diet. The main components of the sensory diet for this study included having a catch with another person, playing the board game Connect Four, using a sensory bin filled with dried peas, wearing noise cancelling headphone, laying in a beanbag chair, squeeze ball, light up spike ball, jumping on a trampoline and bouncing an exercise ball.

The Functional Communication Training consisted of a total of six two-hour session of direct implementation. In addition, there was a two-week baseline period and a two-week reversal period.

At the beginning of each baseline period data was recorded on all aggression and SIB for both participants on a 15-minute interval bases. During implementation data continued to be recorded on a 15-minute interval basis during the time of intervention. FCT was during the time participant was engaged in work hours and Sensory Diet throughout the course of the student's day.

Chapter 4

Results

Summary

In this single subject design study, the effects of two behavioral interventions, a sensory diet and functional communication training, were examined with two young adults with autism spectrum disorder. The research questions to be answered were:

1. Will the use of a strictly regimented sensory diet reduce self-injurious behavior (SIB) and aggression in young adults with autism spectrum disorder?
2. Will functional communication training using an IPad® for an AAC device decrease the amount of SIB and aggressive behaviors in young adults with autism spectrum disorder?

The students were observed during their regular educational programming which consisted of school based instruction and community based instruction at their scheduled job site. Both participants were observed to collect baseline data prior to any behavior intervention implementation; data was collected and analyzed daily.

Individual Results

Figure 1 and Figure 2 illustrate the results for participant 1 on the frequency of aggressive and self-injurious behaviors that occurred during the

baseline phase, where no intervention was implemented, during Phase 1 (Sensory Diet), Phase 2 the reversal (withdrawal of sensory diet), Phase 3 (re-introduction of Sensory Diet.) During the three weeks of the baseline phase, the average frequency of aggressive behaviors that occurred was an average of 5.3 per week. The occurrence of SIB was an average of 8.3 per week. The occurrence of aggression during the three-week implementation of Phase 1, sensory diet, was an average of 4 per week and SIB 1.6 per week. The results show a decrease of 1.3 occurrences per week in aggression and a 6.7 decrease in self-injurious behavior from the baseline phase. During the reversal, Phase 3, where the sensory diet was withdrawn, participant 1 had an average of 5.6 aggressive behaviors a week and 4.3 SIBs a week. This showed an increase in aggressive behaviors from phase 2, implementation of the sensory diet at 1.6 occurrences and an increase of 2.7 occurrences of SIB. The final phase, Phase 3, the re-implementation of the sensory diet, participant 1 displayed on average 2.3 occurrences of aggression and 2.6 occurrences of SIB. This is a 3.3 decrease of aggressive behaviors and a 1.7 decrease in self injurious behavior.

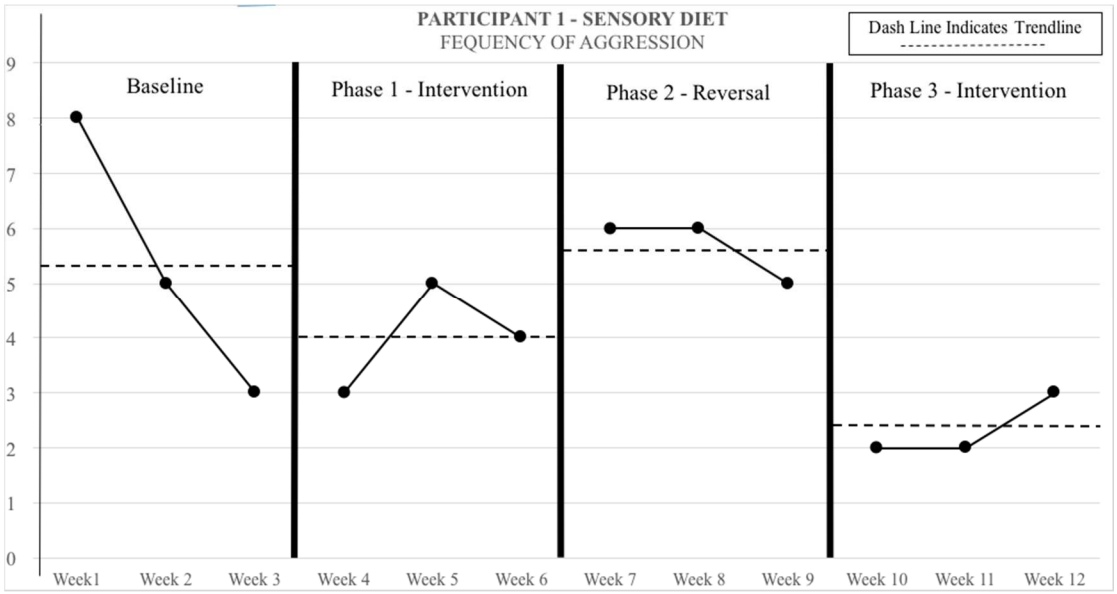

Figure 1. Results for Participant #1 -Sensory Diet- Frequency of Aggression

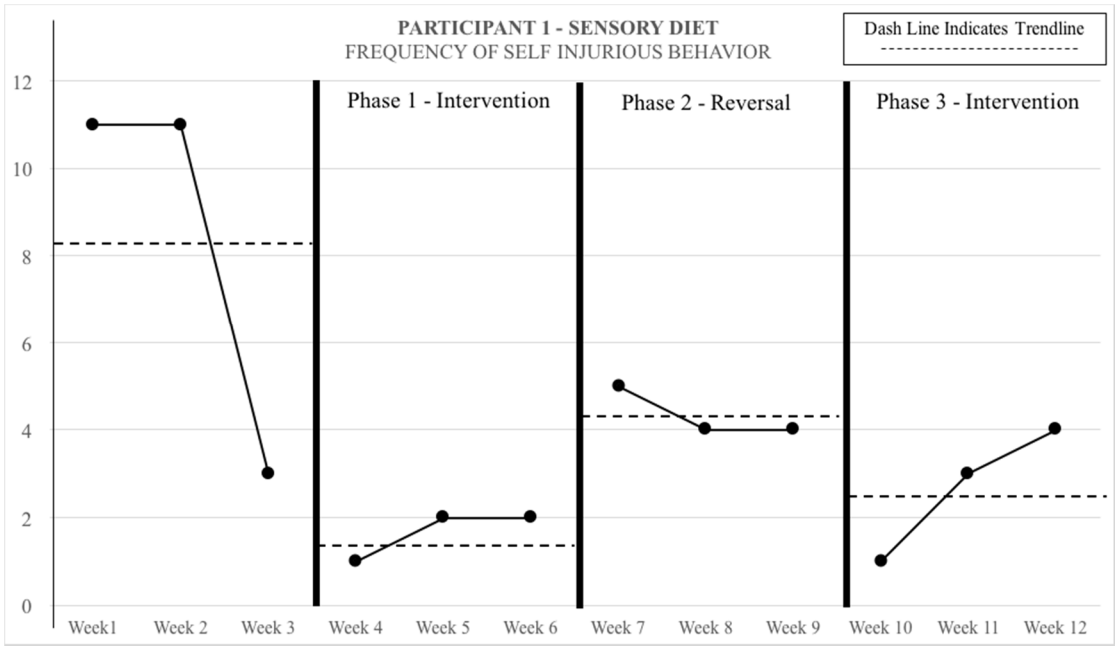

Figure 2. Results for Participant #1 -Sensory Diet- Frequency of Self Injurious Behavior

Figure 3 and Figure 4 illustrate the results for participant 2 on the frequency of aggressive and self-injurious behaviors that occurred each week during the baseline phase, during Phase 1 (functional communication training), Phase 2 the reversal (withdrawal of FCT by pulling visual cue card), Phase 3 (re-introduction of FCT.) During the two weeks of baseline phase, the frequency of aggressive behaviors that occurred was an average of 6.5 per week. The occurrence of SIB was an average of 2 per week. The occurrence of aggression during the two-week implementation of Phase 1, functional communication training, was an average of 6.5 per week and an average of 5 SIB occurrences a week. The results show no change in the occurrence of aggression and an increase of 3 occurrences of SIB. During the reversal, Phase 3, where a visual cue card was pulled from use to withdraw the implementation of the intervention FCT, participant 1 displayed an average of 18.5 occurrences of aggression and an average of 7.5 occurrences of SIB. The final phase, Phase 3, the re-introduction of the visual cue card to implement FCT, participant 2 displayed an average 5 occurrences of aggression and an average of 8 occurrences of SIB. This showed a 13.5 decrease in occurrences for aggression and a .5 increase in SIB.

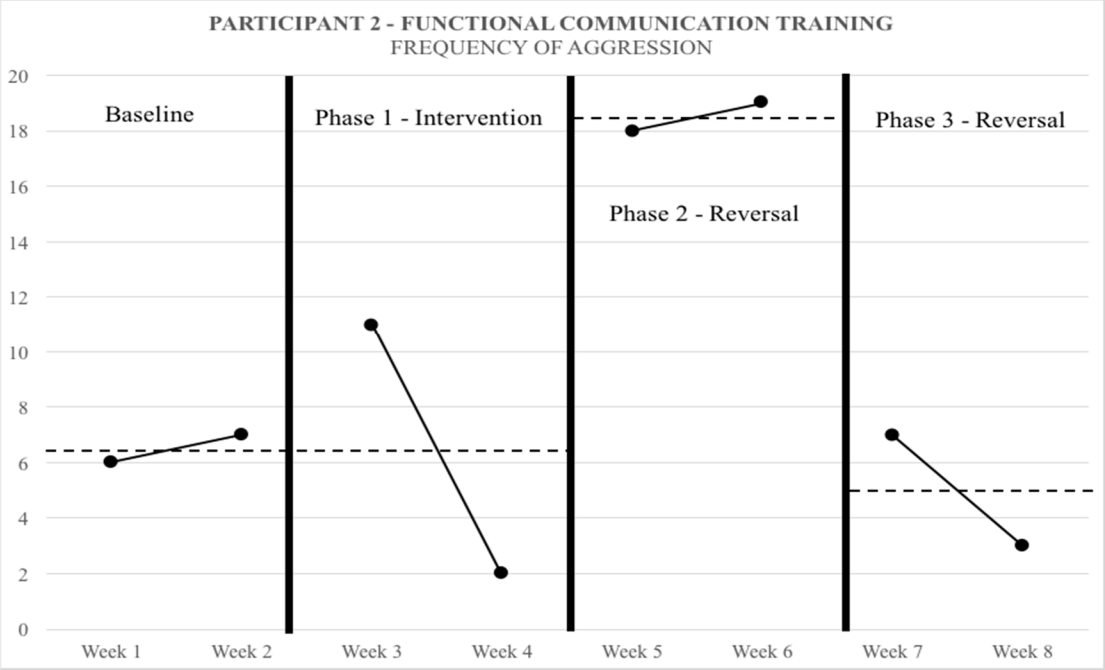

Figure 3. Results for Participant #2 -Functional Communication Training- Frequency of Aggression

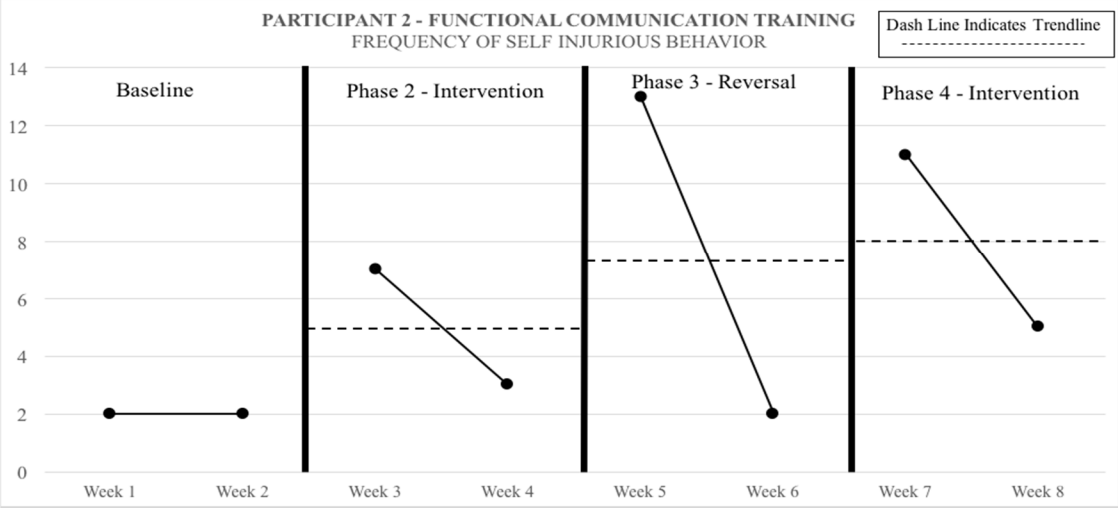

Figure 4. Results for Participant #2 -Functional Communication Training- Frequency of Self Injurious Behavior

Chapter 5

Discussion

Review

This study examined the effects of two different behavioral interventions for young adults with ASD who present with aggressive and self-injurious behaviors. This study took place within the community based instruction program at a private school, out of district placement, for moderately to severely disabled individuals located in a suburban southern New Jersey town. The two behavior interventions were a strictly regimented sensory diet and a functional communication training program implemented using an A-B-A-B, reversal study design. The two participants were non-verbal, young adult males that use an AAC device as their primary means of communication.

The first intervention, a sensory diet, with Participant 1 did show small positive effects with a decrease in frequency of aggressive and self-injurious behaviors from baseline to intervention phase and again from phase 3, reversal (withdraw of treatment) to the return of sensory diet intervention implementation. In prior studies that aimed to decrease challenging behaviors such as aggression and SIB present with individuals with ASD, results indicated the most meaningful effects on decreasing ASD mannerisms was when using a multisensory intervention (Watling et al., 1999) which concurred with the results of this study.

The second intervention, functional communication training, is one of the most common and effective intervention used for severe behavior problems (Tiger, et al.

2008). When this approach was implemented with Participant 2 it had no significant positive effects on improving challenging behaviors such as aggression or SIB. Participant 2 showed an average weekly increase in SIB but these results varied week to week during baseline and intervention phases. Previous research has reported that implementation of FCT proved to have a positive effect on maladaptive behaviors on four children between the ages of 7 to 14 years old (Carr et al. 1985) however this age range is significantly younger than Participant 2.

Limitations

During the study, both participants displayed decreases in aggression; however, results for SIB with the use of FCT demonstrated an increase on average. The results for participant 2 may have been directly impacted by uncontrollable factors of this study that existed in the classroom setting. For example, participant 2 had several changes to his daily schedule, a new job site setting and substitute one-to-one aide's due to temporary staffing issues. This lead to the need for the investigator to re-train different individuals to take data which may have impacted data reliability, and/or limited the scope of analysis. The use of a sensory diet with multisensory interventions did show a positive effect on both aggression and SIB for one young adult male with ASD, it seems for this study the sensory diet is the most effective out of the two interventions.

Because the sample size of this study was limited to only two participants with ASD, this may or may not be a true indication of the overall effects of a sensory diet and functional communication training. In order to determine an effect size, a larger group of

participants would be needed. This sample is also restricted to two male young adults with limited communication abilities. To determine effect size interventions would need to be implemented and compared by multiple individuals from various age groups, to include males and females, and multiple levels of communication abilities.

Implications for Practice

The participants in this study experienced two different behavioral interventions implemented to decrease aggressive and self-injurious behaviors in young adults with ASD. Professionals and educators who are looking to decrease challenging behaviors for young adults in the community or school settings may want to consider implementation of a strictly regimented sensory diet with multisensory interventions. Functional communication training may be more successful with younger and primary students than with young adults since language skills require critical early interventions.

Future Studies

Future research should study the effectiveness of these two behavioral interventions for individuals not only diagnosed with ASD, but for any individuals that display behavior difficulties such as aggression and/or SIB. Future research may also include a variety of ages to determine the effectiveness of various ages and the outcome of the intervention. It is recommended that the sample size be larger. It is recommended to maintain as much consistency as possible within real life settings, outside of a controlled environment and to increase the length of time the study is conducted.

Conclusion

This study obtained answers to the questions: Will the use of a strictly regimented sensory diet reduce self-injurious behavior (SIB) and aggression in young adults with autism spectrum disorder? Will functional communication training using an IPad® for an AAC device decrease the amount of SIB and aggressive behaviors in young adults with autism spectrum disorder? The data illustrated that the behavior intervention that was the most effective in decreasing both aggression and self-injurious behavior was a strictly regimented sensory diet.

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